APPENDIX F

RESERVOIR FISHING AND RECREATIONAL OPPORTUNITIES

C-101371

APPENDIX F. RESERVOIR FISHING AND RECREATIONAL OPPORTUNITIES

1.0 PARDEE RESERVOIR

Pardee Reservoir is in the Sierra Nevada foothills approximately 78 km from Sacramento, 59 km from Stockton, and 12 km from Valley Springs. The reservoir has 890 ha and a shoreline of 69 km. The adjacent watershed land owned by EBMUD encompasses 4154 ha consisting of foothill woodland, chaparral, grassland, and mixed evergreen forest.

1.1 Pardee Reservoir Recreation Area

Pardee Reservoir was opened to the public for fishing, boating, picnicking, and overnight camping in 1958. Pardee Reservoir Recreation Area offers a wide variety of day-use and overnight recreation facilities, and is operated by a private concessionaire and administered by EBMUD. The following facilities are available at Pardee Recreational Area:

- 99 recreational vehicle sites with full hook-ups for sewage, water, and electricity
- 100 developed camping sites on a first come, first served basis
- Day-use areas for picnicking
- Disposal station for R.V.s
- Service station providing gas and propane
- Coffee shop and store
- Boating for power, row, kayak, canoe, sail, and inflatable craft
- Ten-lane paved boat launch ramp
- Full service marina with docks, slips, gas, boat rentals, and a complete line of tackle and live bait
- Flush restrooms (including handicapped restroom), shower facilities, and laundromats
- R.V. storage yard
- Fishing for rainbow trout, kokanee salmon, catfish, sunfish, crappie, and smallmouth and largemouth bass
- Two swimming pools
- Fish cleaning station
- Paved access roads and parking lots

No water contact recreational activities are allowed on Pardee Reservoir due to the reservoir's principal use as a domestic drinking water supply. However, float tubes are permitted in certain areas of the reservoir to provide increased fishing opportunities. The use of float tubes is especially popular during the months of February, March, and April. Shoreline access for anglers is provided at Boathouse Cove, Marina Cove, Woodpile Gulch, and Stony Creek Landing. A newly developed fishing area near Woodpile Gulch will provide additional fishing opportunities for both shoreline and float tube anglers by creating a "no gasoline engine" zone (Figure 1A).

When fully operational, Pardee Reservoir Recreation Area receives between 140,000 and 200,000 visitors annually. The number fluctuates substantially with the surface elevation of the reservoir and the weather. The recreation area is open from mid-February to mid-November, and then closes for three months to coincide with the annual waterfowl migration period. In the last five years, 51 percent of the visitors were anglers (this is an increase over the prior five-year period when it was 31%).

1.2 Pardee Reservoir Fishery

Pardee Reservoir contains a number of coldwater and warmwater fish species, including a number of species that historically existed or currently exist in the Lower Mokelumne River. The following species are known to occur in the reservoir on the basis of angler catch statistics and biological surveys.

Salmonidae
- Kokanee (sockeye) salmon
- Steelhead trout *
- Rainbow trout
- Brown trout

Cyprinidae
- Sacramento squawfish *
- Golden shiner *
- Goldfish *
- Carp *

Catostomidae
- Sacramento sucker *

Ictaluridae
- Brown bullhead *
- White catfish*
- Channel catfish *

Poeciliidae
- Mosquitofish *

Centranchidae
- Blue Gill *
- Redear sunfish *
- Green sunfish *
- White crappie
- Black crappie *
- Largemouth bass *
- Smallmouth Bass *
- Spotted bass *

Cottidae
- Prickly sculpin *

* Denotes fish species currently inhabiting the Lower Mokelumne River.

A summary of the numbers of sport fish caught from Pardee Reservoir is listed in Table 1. The majority of the fish caught are rainbow trout, although a sizable kokanee salmon catch of 9,177 fish occurred in 1990. The angler catch limit is five trout and/or kokanee salmon, five black bass over 12 in., 10 white and/or channel catfish, and an unlimited number of crappie or sunfish. The trout population is replenished by EBMUD through an extensive fish re-stocking program (Table 2). From 1 February to mid-October, EBMUD stocks 1000 pounds of trout two to three times per week. The trout stocked currently average one pound in size.

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2.0 CAMANCHE RESERVOIR

Camanche Reservoir, immediately below Pardee Dam, has a water surface of 3,144 ha and 100 km of shoreline. The adjacent watershed land owned by EBMUD encompasses 6,885 acres consisting of foothill woodland, chaparral, grassland, and mixed evergreen forest.

Camanche Reservoir is not used as a major domestic drinking water supply; there is some minor use at EBMUD's Camanche South Shore Recreation Area. The principal uses of Camanche Reservoir are flood control, storage for downstream water rights holders (primarily agricultural usage), non-consumptive water supply for the MRFH (operated by the CDFG), water supply for the downstream river fishery and associated wildlife resources, and support of the reservoir's cold and warmwater fisheries.

2.1 Camanche Reservoir Recreation Area

Two Camanche Recreation Areas (North and South) were developed and opened to the public in 1964, following the construction of Camanche Dam and related facilities by EBMUD. The Camanche Recreation Areas provide a variety of day and overnight recreational opportunities, and the facilities are operated continuously throughout the year. The following facilities are available at the two recreation areas:

- 200 mobile home sites
- R.V. sites with full hookups for water, sewer and electricity (South Shore only)
- Developed camp sites
- Day-use areas for picnicking
- Disposal stations for R.V.s
- Two service stations providing gas and propane
- Two cafes and two general stores
- Rental cottages and mobile homes
- Amphitheater and outdoor movie projection facility (South Shore only)
- Stable and guided horse rentals (North Shore only)
- Hiking and equestrian trails
- Paved parking lots and access roads throughout both recreation areas
- Flush restrooms, shower facilities, and laundromats
- Six tennis courts
- Three paved launch ramps
- Full service marinas providing berths, boat rentals (pontoon, motor, and row boats), and bait and tackle
- Fishing for rainbow and brown trout, channel and white catfish, sunfish, crappie, largemouth and smallmouth black bass, spotted black bass, and white sturgeon

Because Camanche Reservoir is not a major domestic drinking water supply, water contact recreational activities including swimming, water skiing, jet skiing, and windsurfing are allowed year-round.

In 1987, EBMUD's Watershed and Recreation Division assumed administrative control of the Camanche North and South Shore Recreation Areas for the purpose of resolving poor concessionaire operations, management, and maintenance of the privately owned facilities. Following a considerable and unsuccessful effort from 1987 through 1989 to meet compliance objectives mandated by local, state, and federal agencies, EBMUD purchased all the privately owned leasehold rights and personal property of the two private concessionaires operating the Camanche Recreation Areas for a purchase price of $4,259,368. The purchase took place from 1989-1990; through 1991, EBMUD has spent $2.5 million dollars refurbishing facilities at both recreation areas. It is estimated that approximately $12 million more dollars will be necessary over the next decade to bring all facilities up to EBMUD standards.

In 1990, public use of both recreation areas totalled 323,529 visitor days. Of the total number of visitors, approximately 30,319 were anglers. In 1991, the total number of visitor days for both recreation areas was 352,325, of which 53,797 were anglers.

2.2 Camanche Reservoir Fishery

Camanche Reservoir contains a number of coldwater and warmwater fish species, many of which historically or currently exist in the Lower Mokelumne River below Camanche Dam. The following species are known to occur in the reservoir on the basis of angler catch statistics and biological surveys.

Acipensenidae
- White sturgeon

Clupidae
- Threadfin shad **

Salmonidae
- Steelhead rainbow trout **
- Rainbow trout

Cyprinidae
- Hitch **
- Sacramento blackfish **
- Golden shiner **
- Goldfish **
- Carp *

Catostomidae
- Sacramento sucker **

Ictaluridae
- Brown bullhead **
- White catfish **
- Channel catfish **

Poeciliidae
- Mosquitofish **

Osmenidae
- Inland silversides **

Centrarchidae
- Blue Gill **
- Redear sunfish **
- Green sunfish **
- White crappie
- Black crappie
- Largemouth bass **
- Smallmouth Bass **
- Spotted bass **

Cottidae
- Prickly sculpin **

** Denotes fish species currently found in the Lower Mokelumne River.

In 1987, EBMUD's Watershed and Recreation Division assumed administrative responsibility for the Camanche Reservoir fishery. The fishery is now actively monitored and managed through regularly scheduled electrofishing surveys, cooperative habitat improvement projects, and fish replanting programs for both coldwater and warmwater fish species. EBMUD's commitment to an effective fishery management program was formalized with the adoption of the Camanche Recreation Area Plan on 23 January 1990. The key elements of the fishery management plan that is part of the overall recreation plan include:

- Angler access and replanting programs
- Continuation of fish habitat enhancement projects
- Increased law enforcement coverage
- Removal of some non-game fish
- Routine surveys of species composition and relative abundance
- Continuation of Camanche water quality studies and monitoring program

These fishery management elements, along with the recreation facility improvements currently being made by EBMUD, will enhance future Camanche Reservoir fisheries and recreational opportunities.

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2.2.1 Camanche Reservoir Fisheries Habitat Enhancement

Substantial habitat structures have been placed along the shore of Camanche Reservoir in coves where spawning is likely to occur. The structures provide microcover where newly emerging black bass and sunfish can take refuge from predators. Escape cover has been introduced in the form of artificial structures such as brush piles, tires, and cans/barrels and established through revegetation projects through a cooperative program with the USDA-Soil Conservation Service in Lockeford, California. Artificial structures were constructed with oak and manzanita clumps cabled to the bottom with steel T-posts and with groups of tires held to the bottom in a similar manner. The shelters are placed in coves perpendicular to the waters edge so that cover can be provided under different reservoir elevations. The first shelters were placed in Camanche Reservoir in 1983. Since that time, fire crews with summer youth organizations have provided materials in the process of clearing brush for fire suppression projects. Brush piles and groups of tires have been placed along Camanche North Shore, Camanche South Shore, China Gulch, Lancha Plana, Rabbit Creek Arm, and Oregon Bar. A CDFG cooperative electrofishing survey during April 1990 showed that largemouth bass, black crappie, and bluegill were abundant around the brush structures in coves along Camanche South Shore.

2.2.2 Fish Stocking Programs

In 1986, EBMUD began its program by purchasing 4,200 lb (over 8,000 fish) of trout from Calaveras Trout Farm for stocking at both the North and South Shore Recreation Areas. The size of the trout stocked were at least two/lb. On 15 December 1986, 124 white sturgeon, ranging in size between 6.5 and 12.5 lb, were stocked at the base of Pardee Dam. Between 23 May and 27 July, 1989, EBMUD stocked 7,200 lb of one-pound average size trout at the base of Pardee Dam. In 1990, EBMUD stocked 19,000 lb of trout, 4,000 lb of channel catfish, and 15,000 two-inch Florida strain largemouth bass in Camanche Reservoir. In 1991, 61,200 lb of trout, 2,000 lb of catfish, and 24,000 Florida strain largemouth bass fingerlings were stocked by EBMUD at both Camanche recreation areas. Under the current program, trout are stocked at both the South and North Shore Recreation Areas and adjacent South Shore fishing ponds, from January through May and late October through December. Channel catfish are stocked in late June, July, and August to augment the trout stocking with a trophy-sized warmwater species.

2.2.3 Camanche Reservoir Fishery Catch Statistics

The CDFG implemented a creel census program for Camanche Reservoir during July 1985, but due to funding constraints of seasonal aid positions, they have not conducted creel census programs in recent years.

In 1990, EBMUD started a fishing access program to generate revenues for restocking fish and to obtain fishery data through angler volunteer returns of fishing access cards. In 1990, public use of both recreation areas totalled 323,529 visitor days. Of the total number of visitors, approximately 30,319 were anglers (9.4 %). In 1991, the total number of visitor

days for both recreation areas was 352,325 of which 53,797 (15.3 %) were anglers. In 1991, the first complete set of Camanche Reservoir catch statistics were compiled by EBMUD using the angler volunteer returns of fishing ac
cess cards. The expanded data to project catches for the entire Camanche Reservoir fishery show that approximately 21,000 trout, 21,000 black bass, 5,000 crappie, 2,000 catfish, and 14 sturgeon were caught during 1991.

In addition to the fishery information compiled by EBMUD, a limited amount of data are also available from CDFG's computer records on black bass tournaments licensed by the CDFG and held on Camanche Reservoir. Data from black bass tournaments held on Camanche Reservoir during 1987 and 1988 show a range of catch-per-unit-of-effort (angler-hour) of 0.14 to 0.4 in 1987 and from 0.15 to 0.21 in 1988. During the 1990 Pacific Fishery Biologist Conference, CDFG reported that the statewide average in 1989 was 0.2 bass/angler hour.

2.2.4 Camanche Reservoir Electrofishing Surveys

To sample littoral areas for the purpose of determining warmwater fish species composition and relative abundance, EBMUD began electrofishing surveys in Camanche Reservoir in 1988. A Smith-Root electrofishing boat, moving along the shoreline for a specified time (usually 700 seconds) is used to capture fish. The boat operation stuns fish with a direct current of electricity passing from the boat hull (acting as the cathode) to either of two anodes suspended off the bow. Stunned fish move toward the anode where they are netted and placed in a live well. Lengths are taken and the fish released near the site of capture. Data obtained from these efforts are entered into Lotus spread-sheets and calculations of fish abundance are made. Fish abundance is calculated as catch-per-unit-effort (CPUE); in this example, fish-per-minute of electroshocking time.

Data collected from these surveys are essential in providing an overall picture of Camanche Reservoir and in showing what trends may be evident in the fishery; however, there are some limitations to the methodology. For example, the size of the electrical field generated by the equipment limits the stunning distance to about 3 m in depth, so sampling efforts are necessarily limited to nearshore sites. Coldwater species such as rainbow trout, pelagic species such as threadfin shad, and benthic species such as white sturgeon are not particularly available under these circumstances. Because of differences in reservoir elevations between sample years, water clarity, water temperatures, and other factors such as the differential distribution occurring with the progression of natural spawning activity, the results from one year cannot be directly compared with another. Also the abundant numbers of young-of-the-year (YOY) age class fish seen in the fall samples make comparisons with spring sampling unreliable. Still, much can be learned about the status of the fishery from these studies.

Since 1988, two surveys have been conducted each year in Camanche Reservoir, once in the spring (May or June) and another in the late summer-early fall (August or September). Sample locations include the face of Camanche Dam (Dam), the dike along Camanche South Shore (Dike), China Gulch east of the Narrows (China Gulch), the Narrows (a narrow

portion of the Reservoir near China Gulch), the island near the Rabbit Creek arm (Rabbit), and the area below the Lancha Plana Bridge (L.P.). The area of the reservoir adjacent to Penn Mine, and the reservoir-river interface (Camflex) are also sampled when time permitted. The Dam, the Dike and Rabbit are all sites in the most open portion of the reservoir. The Narrows, Lancha Plana, Penn Mine and Camflex are located in the upstream, more narrow portion of the reservoir. China Gulch is near the Narrows, though it has aspects of both areas.

2.2.4.1 Spring Survey Results

Spring electrofishing surveys were not done in 1989. An alternate survey was performed in August and a later summer survey was completed in September. Camanche water surface elevation was 188 feet at the time of the August sampling (Figure 1). Comparisons between August and the other spring sampling efforts would not be especially useful; however, an overview of the results shows that centrarchid CPUE values were very high. Largemouth bass were plentiful at all sites but were most abundant at the Narrows (CPUE > 5.0) (Figure 2). Black crappie had a CPUE of 21.0 at the Dam and 27.0 at the Dike (Figure 3). When compared with other years, other sunfish species were also abundant, with CPUEs from 1.0-7.0 at most sites.

Spring electrofishing for 1990 was performed in May only at the Dam, the Narrows, the Dike, and Camflex. Camanche Reservoir water surface elevation was 60 m at the time of the sampling effort (Figure 1). The most numerous fish at the three regular reservoir sites were spotted bass (Figure 4) (average CPUE of 3.0 fish/minute), followed closely by bluegill (2.7) and green sunfish (2.3). The highest individual CPUE was 7.1 for bluegill at the Narrows (Figure 5). Bluegill, all three species of bass, carp, and channel catfish (Figure 6) were found at all three regularly sampled reservoir sites. Sacramento suckers and rainbow trout were found only at the Camflex (River) site.

In June of 1991, only four of the six basic sites were sampled: the Dam, the Dike, China Gulch, and the Narrows. The water surface elevation was 55 m during electrofishing (Figure 1). Bluegill were the most numerous fish (average CPUE of 7.4), with black crappie the least numerous of those species captured (average CPUE of 0.04). Again, although this is in stark contrast to the CPUEs > 20.0 for August 1990, the difference in the sampling dates and the schooling and sometimes pelagic nature of crappie make comparison invalid. The highest CPUE was 22.6 for bluegill at the Dam, nearly four times the next highest value of 6.0 for green sunfish at China Gulch (Figure 8). Only green sunfish and largemouth bass were found at all four sites (Figures 7 and 8). Sculpin, channel catfish (Figure 9), threadfin shad, and golden shiners were all absent from the samples. Sculpin and catfish are benthic so their CPUE values are always low; their omission from one sampling period is not a cause for alarm. Threadfin shad is a pelagic species that disperses widely in schools; as a result, electrofishing results tend to be either very high or low. Golden shiners were never numerous in our sampling of Camanche Reservoir.

All sites were sampled in May of 1992 and total fish numbers were lower than usual. Camanche Reservoir water surface elevation at the time of sampling was 56 m. The most numerous fish were bluegill with an average CPUE of 9.6, with green sunfish (average CPUE = 3.7) the only other species found with a CPUE greater than 0.5. The highest CPUE for any individual site was for bluegill at the Dam (19.4) (Figure 11), followed by bluegill at Lancha Plana (16.6), and green sunfish at Lancha Plana (10.7). Only bluegill and largemouth bass (Figure 10) were seen at all six regular sites. As is typical of the Camanche sampling results, the river site produced lotic species seen nowhere else, including Sacramento suckers, hitch, and smallmouth bass. Threadfin shad numbers were much reduced from previous years and were found only at the Dike (with a site CPUE of 1.1, average CPUE of 0.2). White catfish were more numerous than in previous years and were taken at five of the six sites (Figure 12). Hybrids between largemouth and other black bass species were seen at four of the six sites. No white crappie were captured at any site.

Camflex and a site just below Penn Mine were also sampled in May of 1992. Camflex had the lowest combined CPUE for the three species of sunfish, but was otherwise similar to the other regularly sampled sites (Figures 10-12). At water surface elevations at or below 55 m, Camflex is a lotic habitat that provides cover for many large adult fish. However, when it was sampled at 56 m, the electrofishing boat was unable to negotiate past the bedrock islands near the reservoir-river interface, and sampling occurred more in the lake than in the river.

2.2.4.2 Late Summer Survey Results

In September 1989, all regular sites except the island at Rabbit Creek were sampled. The Camanche Reservoir water surface elevation at this time was 57 m. The results from this survey show that the most abundant species, based on average CPUE for the remaining five sites, were black crappie and white crappie (CPUE of 7.7 and 8.0, respectively). The highest individual CPUE was recorded at the Dike for black crappie (26.3) and for white crappie (26.9) (Figure 14). Of the 17 recorded species, 8 occurred at all sites. Centrarchids (sunfish and bass) were the most widely occurring family, comprising 7 of these 8 fish species (Figures 13 and 14). Among non-centrarchid species, threadfin shad (2.7) and carp (2.3) occurred at all five sites. Smallmouth bass were fairly numerous at three sites but not taken at two others, resulting in an overall CPUE of 1.2 fish/minute. Other CPUE values ranged from 0.007 (goldfish) to 0.56 (Sacramento blackfish). Most of these scarce species (sculpin, catfish, redear sunfish) utilize benthic habitats and are not easily captured by electrofishing.

The late summer electrofishing for 1990 was completed in August and encompassed all six regular sites as well as Camflex. Water surface elevation at the time of sampling was 194 feet (Figure 1). CPUE averages for the six sites overall were slightly lower than other years, although the threadfin shad average CPUE was a very high 33.7, with a maximum value of 118.3 at China Gulch. Threadfin shad were ubiquitous in the reservoir at this time, moving in front of the boat in great schools that probably contained a significant portion of the Camanche fish biomass. When threadfin shad are so numerous they provide abundant forage for adult predators; however, they hamper the development of juvenile bass and other

centrarchids through competition for zooplankton (John Hopkirk, pers. comm.). Only bluegill, smallmouth bass, and threadfin shad were found at all regular sites, and threadfin shad were found at every site sampled. Bass were more numerous in the open water sites (the dam, the dike, and the island at Rabbit Creek), although the CPUE for spotted bass at the narrows was 1.9 (Figure 16). Sunfish were found at all sites except Camflex, and significant numbers of black crappie were sampled at China Gulch (Figure 17). White catfish were taken at the dam in large numbers, though channel catfish were absent from this site (Figure 18). The Camflex site contained rainbow trout and Sacramento suckers, both riverine species not found at the regular sites.

In September of 1991 as in 1990, all six regular sites and Camflex were sampled. Reservoir water surface elevation was 54 m (Figure 1). The highest average CPUE values were obtained for bluegill (11.6), green sunfish (7.6), and largemouth bass (7.0). The highest site CPUE was for bluegill at the dam (25.2) (Figure 20). Other high CPUE values were obtained with bluegill at the Narrows and at the dike. These three centrarchid species, channel catfish, and threadfin shad, were found at all regularly sampled sites. CPUE for largemouth bass was very high throughout the reservoir (Figure 19). These values reflect high numbers of YOY bass, indicating excellent recruitment. Channel catfish were also relatively numerous throughout the reservoir (Figure 21). The Camflex site, due to the lotic conditions of the river produced three species found nowhere else: rainbow trout, Sacramento squawfish, and Sacramento sucker.

2.2.4.3 Evaluation of Electrofishing Results

When reviewing the results of EBMUD's electrofishing efforts from 1989 to 1992, several patterns in the data become apparent. First, there is a difference between Camanche Reservoir sites near open water (the Dam, the Dike, and Rabbit), and those nearer the river (the Narrows, Lancha Plana, Penn Mine, and Camflex). China Gulch has aspects of both types because it has considerable littoral habitat, yet it opens into the reservoir near the Narrows. Open water sites provide more habitat for species needing littoral areas to spawn (i.e., centrarchids), whereas sites associated with the river provide habitat for lotic species. Indeed, as one moves "upstream" (from the Narrows to Lancha Plana to Penn Mine to Camflex) one is increasingly likely to find species such as Sacramento suckers, hitch, and rainbow trout in the sample. Conversely, the CPUE values for lentic species such as sunfish and black bass tend to be highest at the reservoir sites (see Figures 2-21), though there are many exceptions.

The distribution of the fishes in Camanche Reservoir varies seasonally as the result of spawning and other factors. For instance, when black bass are spawning in the spring and early summer (see Figures 2,4,7,10) they are more abundant at the reservoir sites; however, subsequent to spawning they may be more easily caught at the Narrows (see Figures 13 and 19). This distributional difference reflects a difference in local habitat selection. A lower CPUE at the reservoir sites does not mean that black bass have left those areas but only the sampled habitats.

Life histories may also affect the distribution of fishes in the reservoir. Crappie school when not spawning and so may appear in large numbers in some samples and be absent elsewhere (see Figures 14 and 17). Redear sunfish are benthic fish not easily caught with electrofishing methods; however, while they are spawning in the early summer, fifty or more may be seen along the shoreline. Catfish and bullhead YOY may not appear in samples because they live in benthic habitats beyond the range of the normal electrofishing operation.

Camanche Elevations

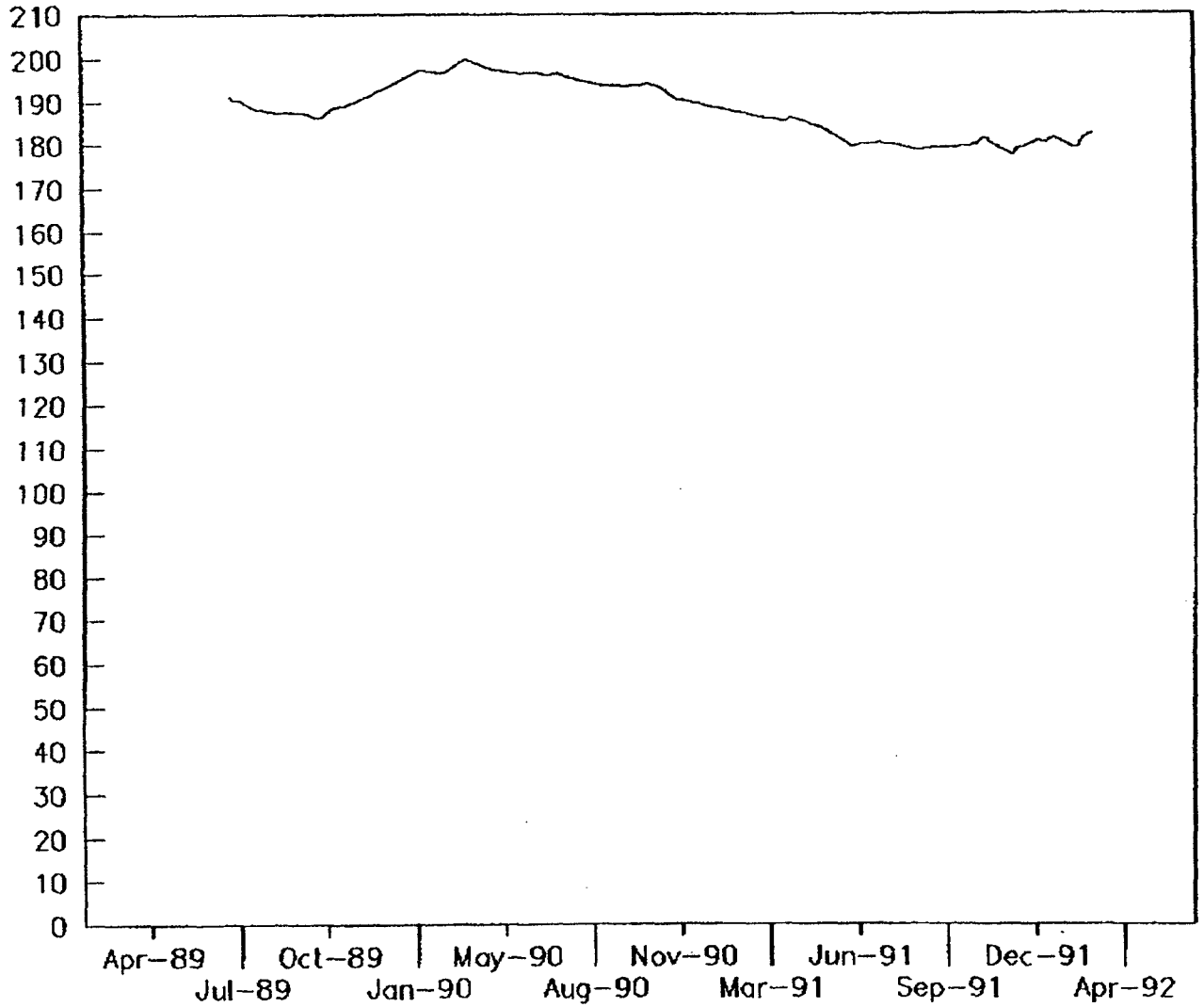

Figure 1

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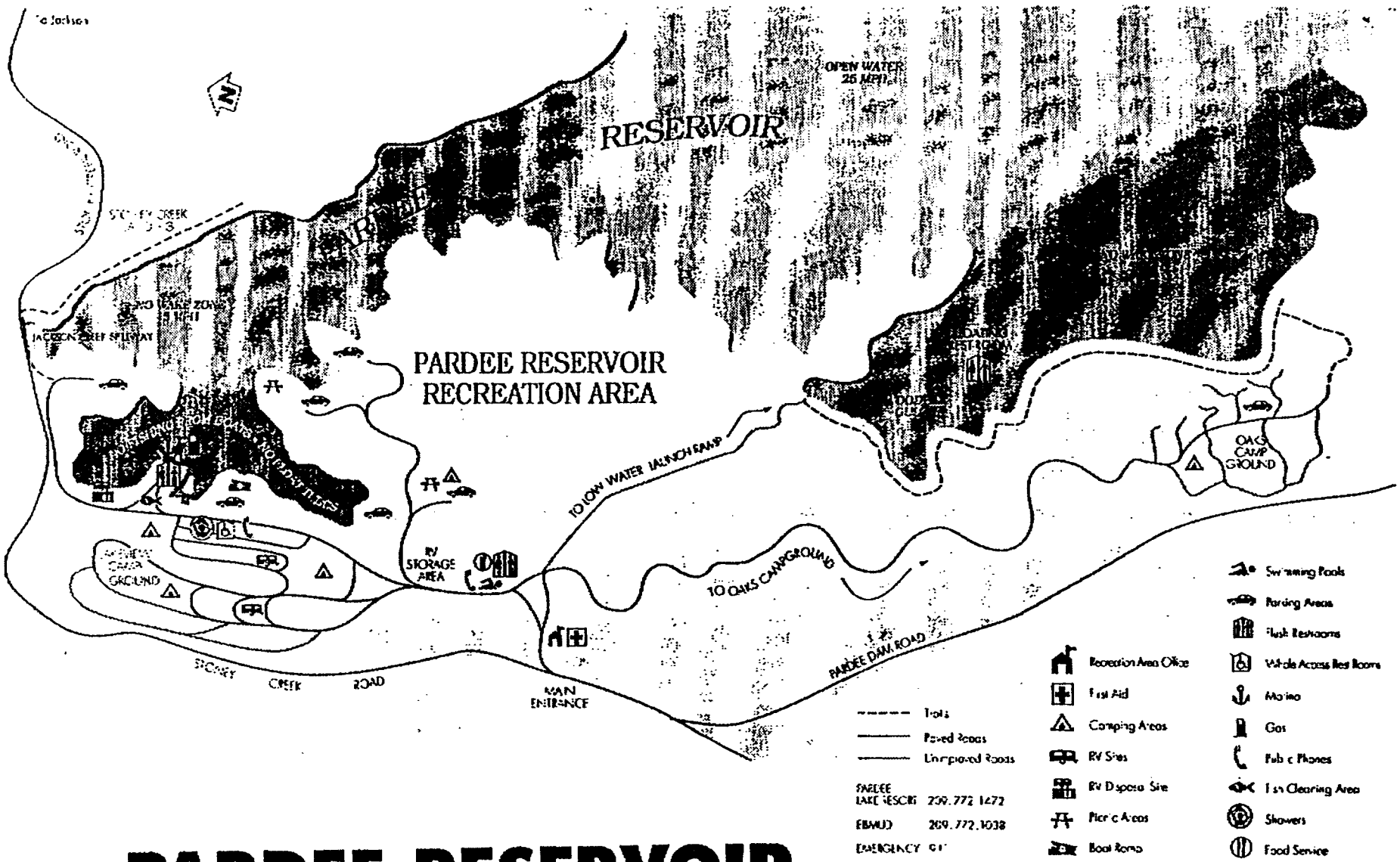

PARDEE RESERVOIR

FLOAT TUBING SAFETY AND ETIQUETTE

Figure 1A

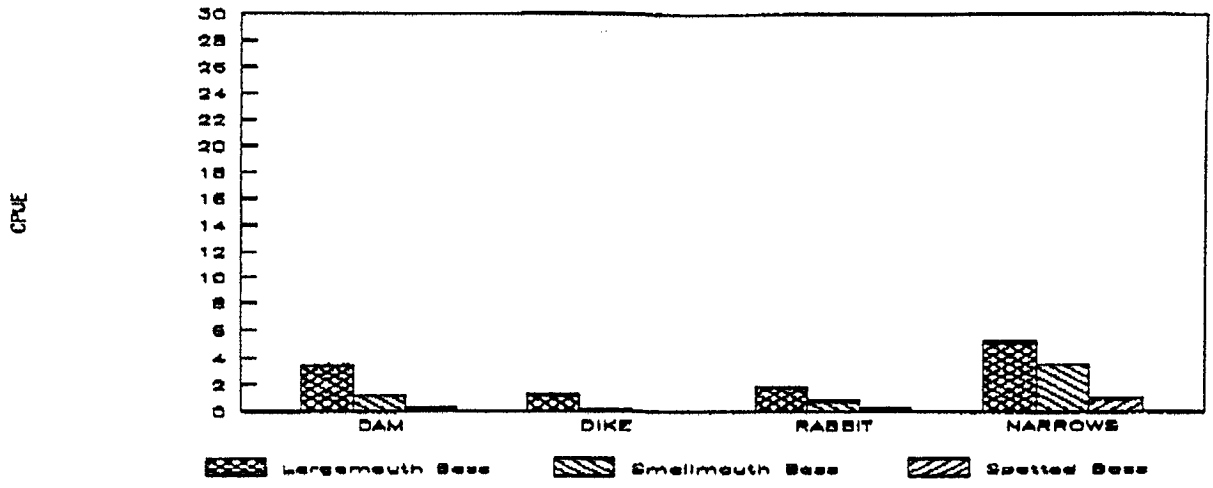

Figure 2

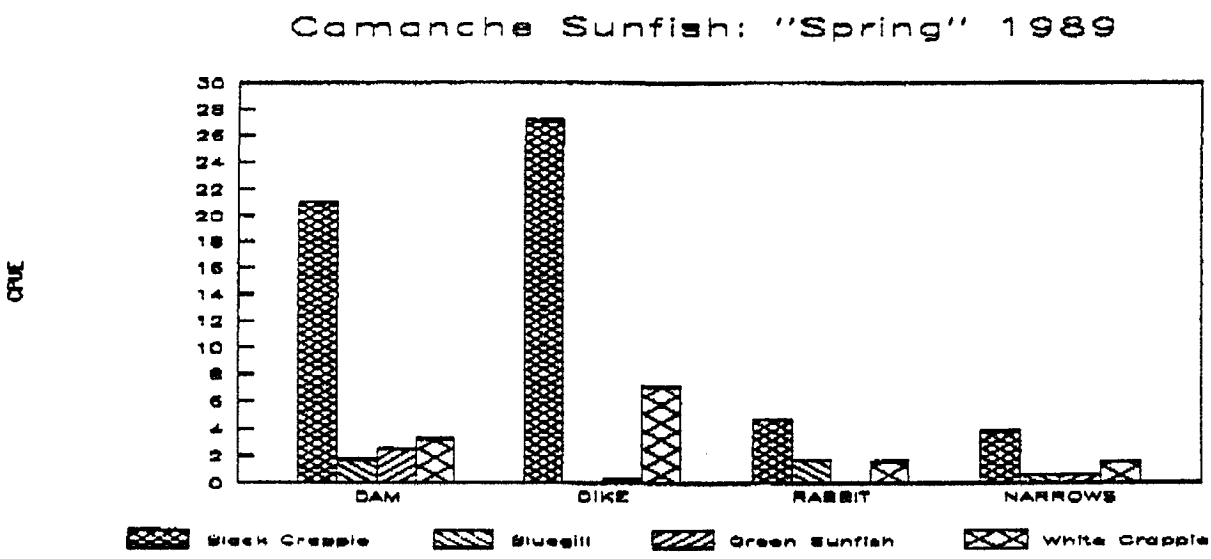

Figure 3

09, 03, 92 02:30 PM *WATERSHED/REG. HDQ. P07

C-101386

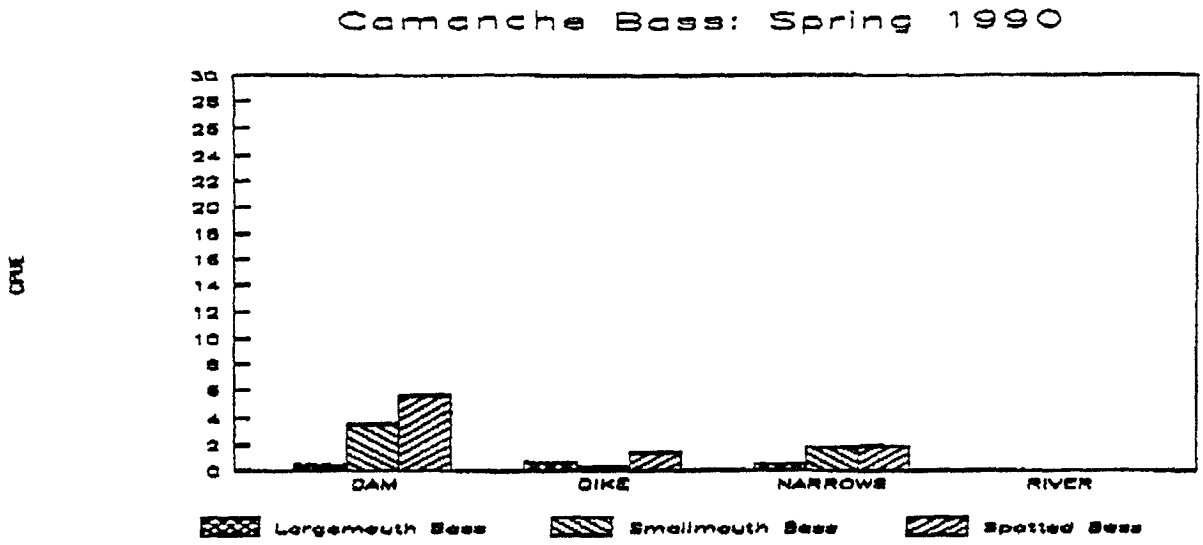

Figure 4

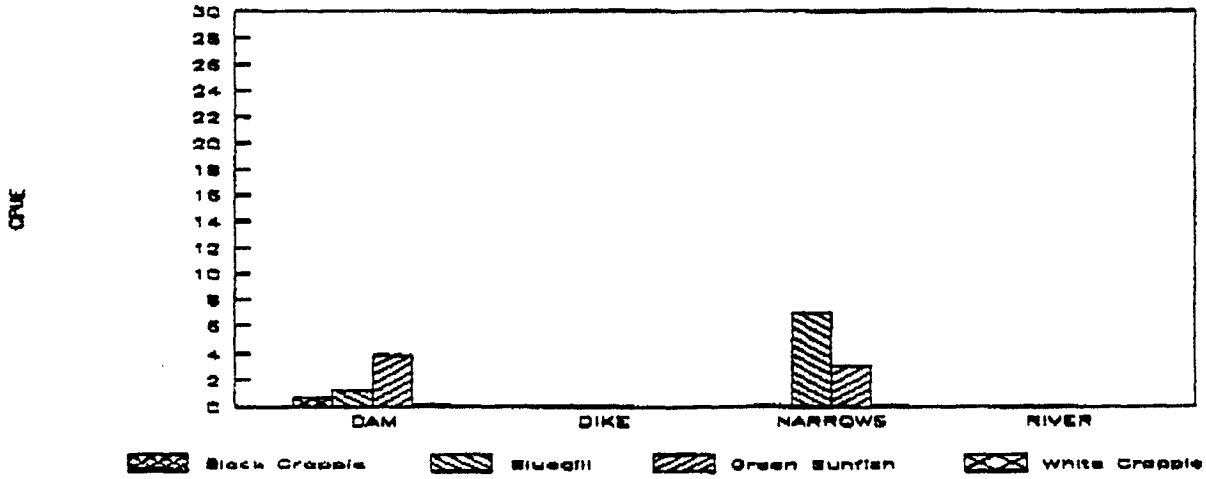

Figure 5

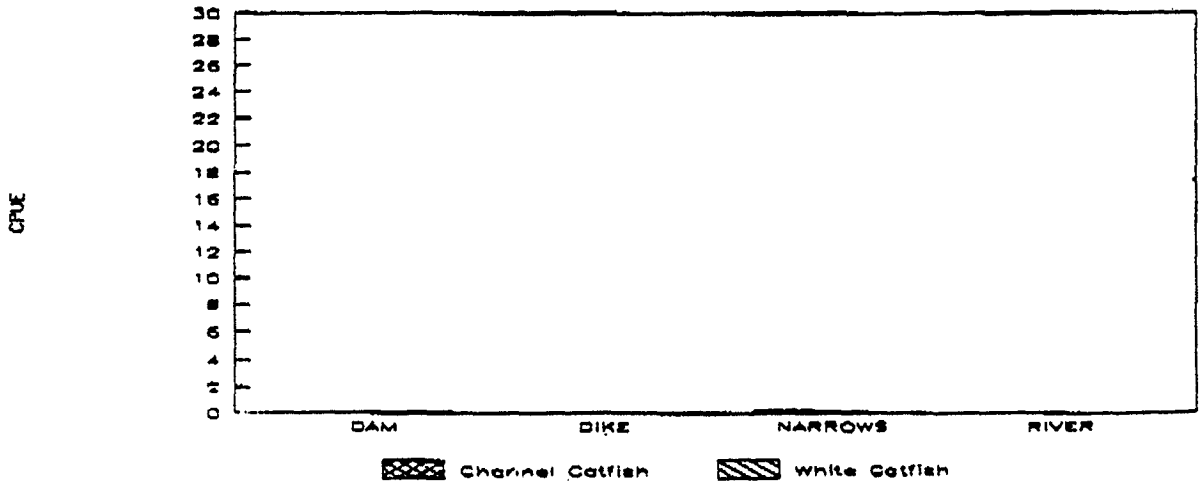

Figure 6

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C—101387

Comanche Bass: Spring 1991

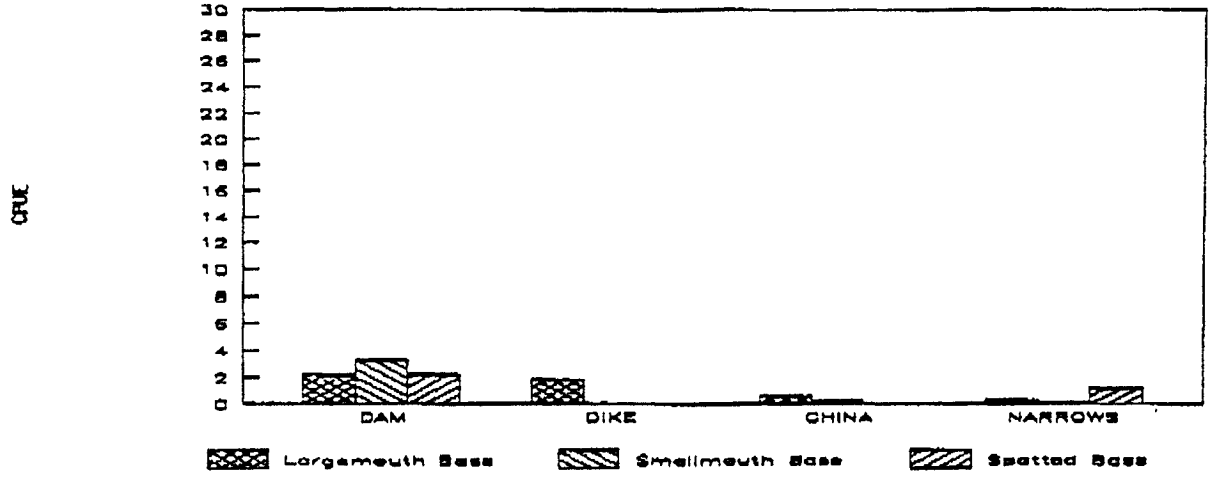

Figure 7

Comanche Sunfish: Spring 1991

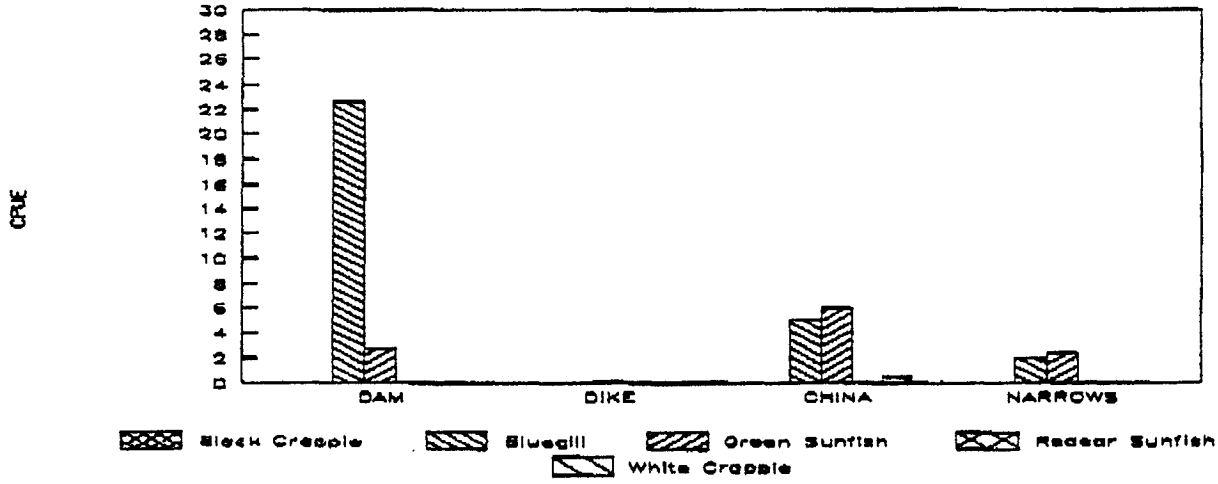

Figure 8

Comanche Sunfish: Spring 1992

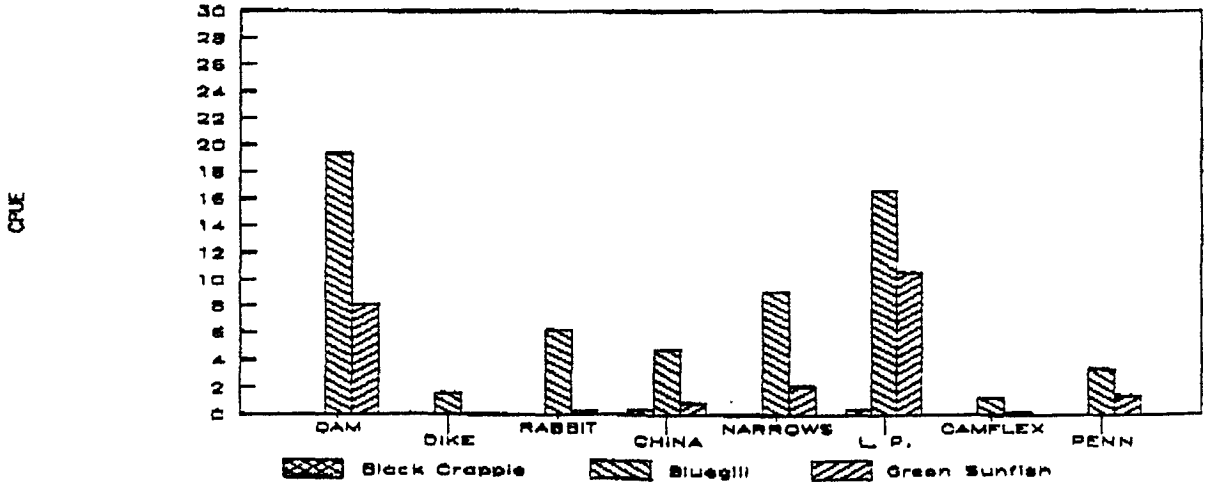

Figure 9

C-101388

Comanche Bass: Spring 1992

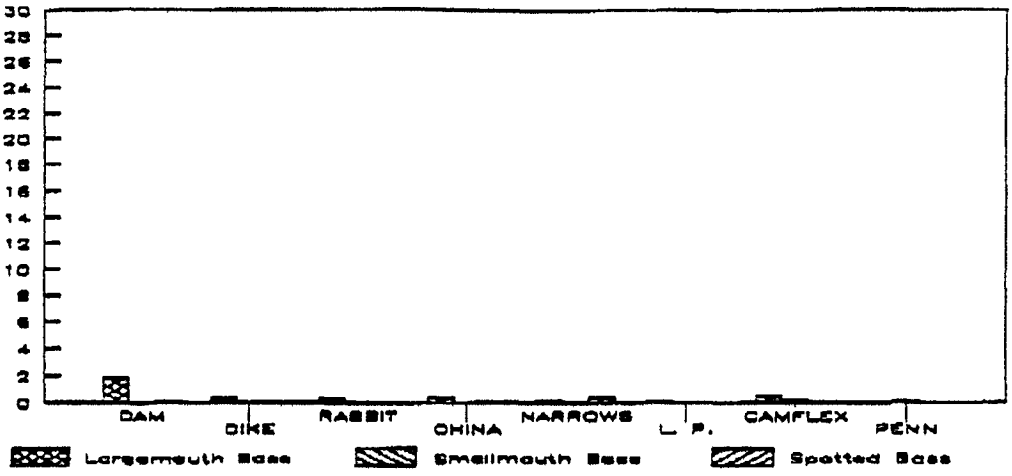

Figure 10

Comanche Sunfish: Spring 1992

Figure 11

Comanche Catfish: Spring 1992

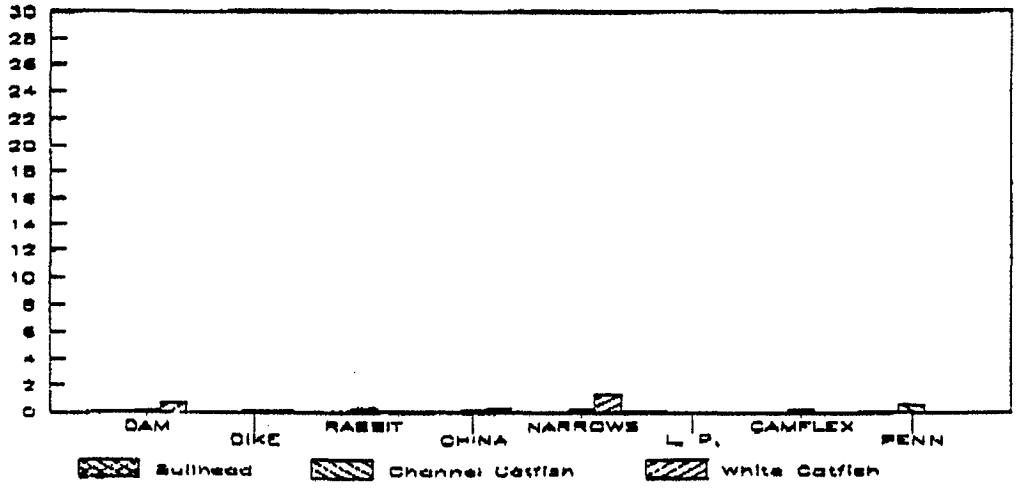

Figure 12

C—101389

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Camanche Bass: Fall 1989

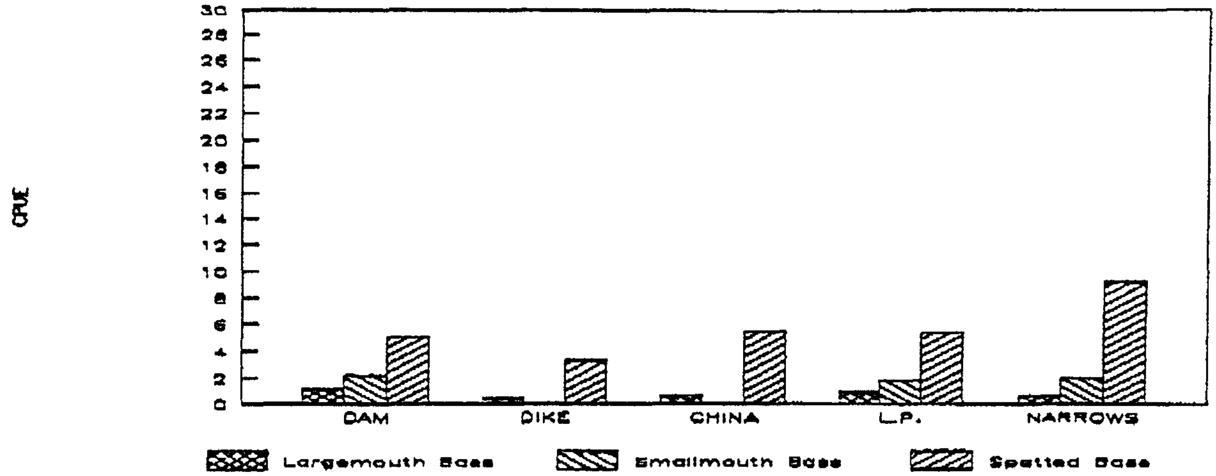

Figure 13

Camanche Sunfish: Fall 1989

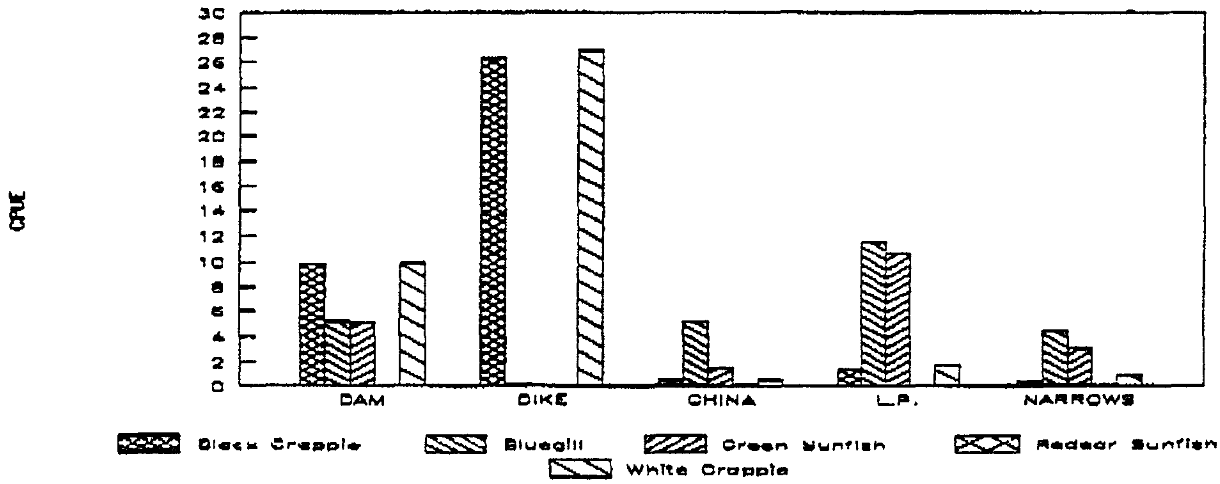

Figure 14

Camanche Catfish: Fall 1989

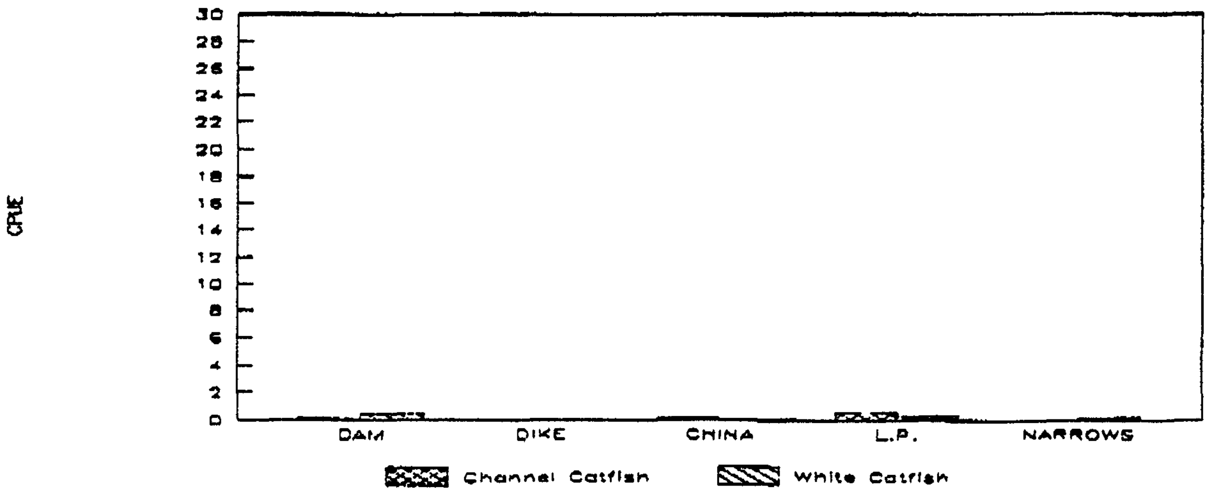

Figure 15

C-101390

Comanche Bass: Fall 1990.

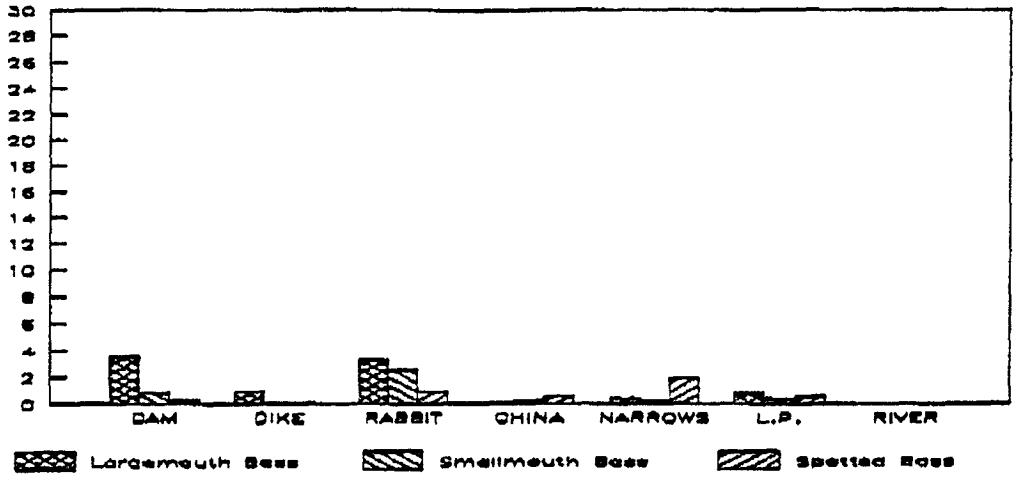

Figure 1(

Comanche Sunfish: Fall 1990

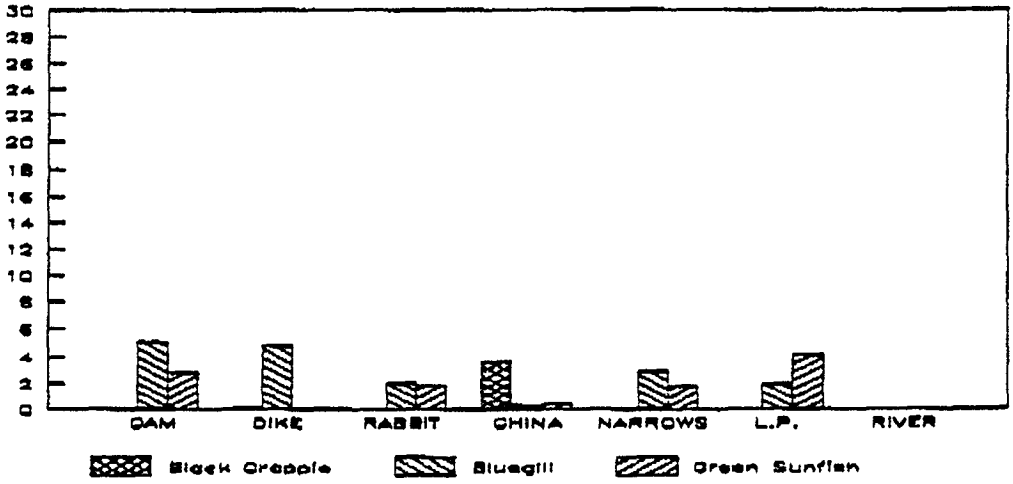

Figure 17

Comanche Catfish: Fall 1990

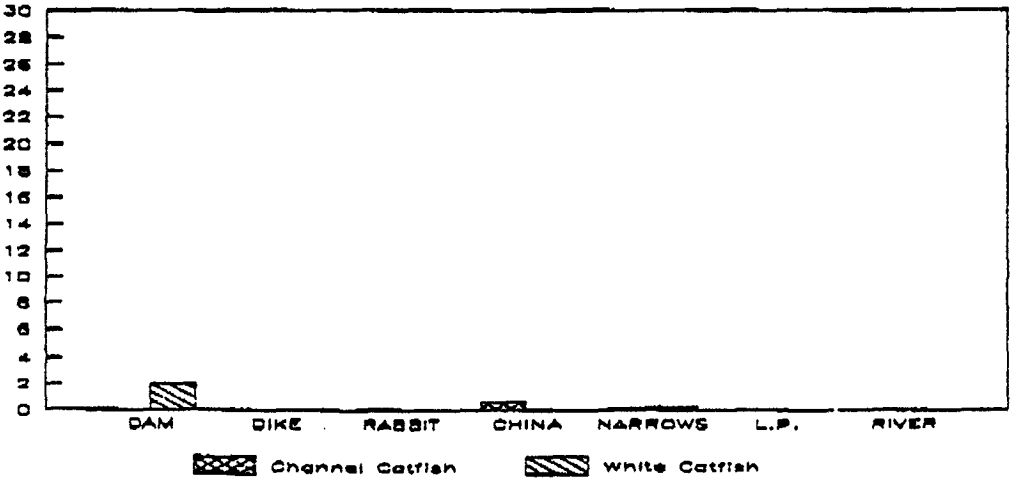

Figure 18

C-101391

Camanche Bass: Fall 1991

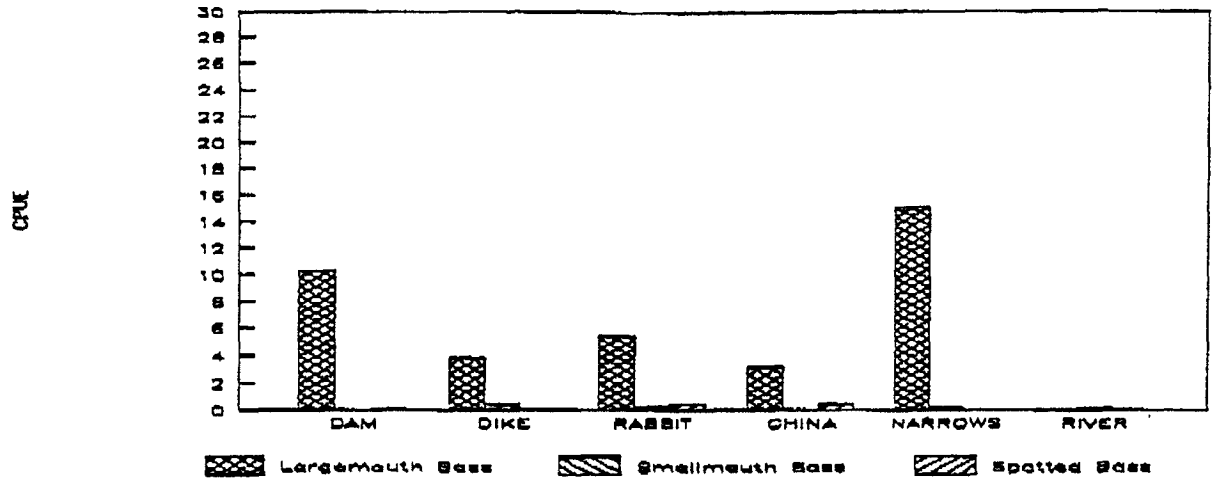

Figure 19

Camanche Sunfish: Fall 1991

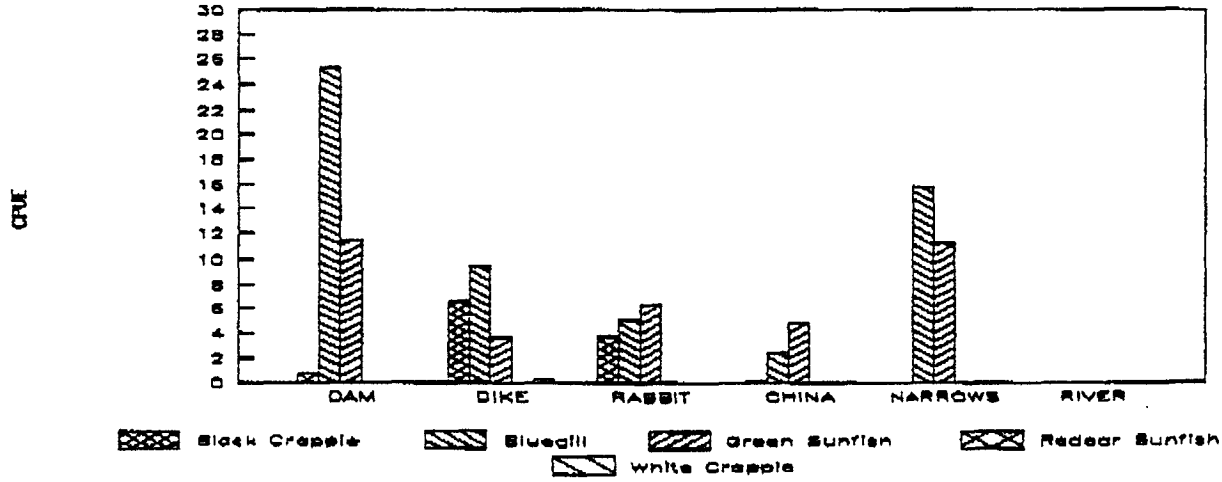

Figure 20

Camanche Catfish: Fall 1991

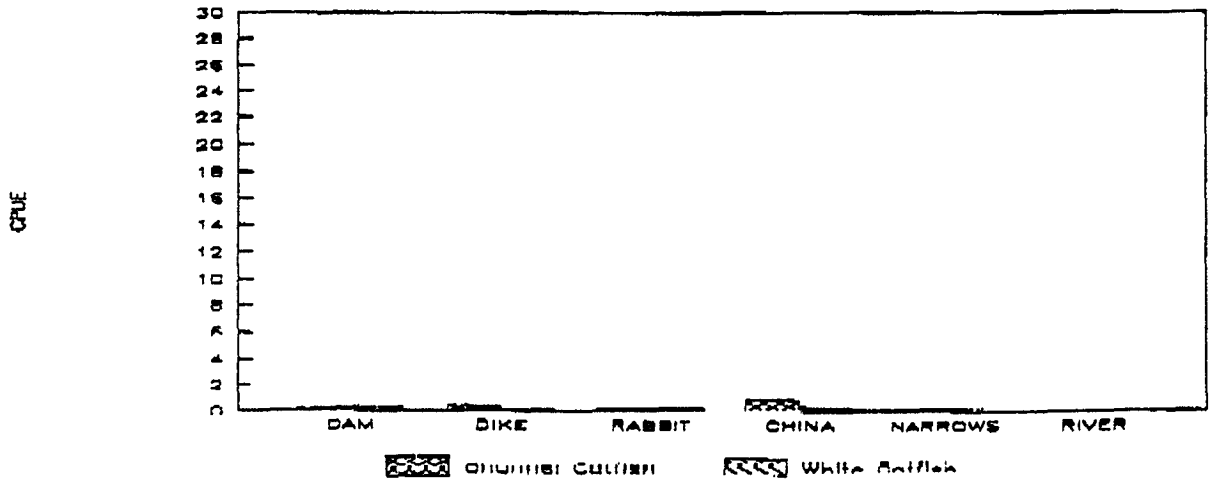

Figure 21

C-101392

TABLE 1 - NUMBERS OF SPORT CAUGHT GAME FISH FROM PARDEE AND CAMANCHE RESERVOIRS.

PARDEE RESERVOIR
FISH CAUGHT

YEAR	TROUT	KOKANEE	BLACK BASS	CATFISH	CRAPPIE/ SUNFISH
1980	36,765	8,446	7,860	1,765	17,325
1981	31,818	13,040	4,554	953	5,621
1982	43,565	8,420	2,867	697	2,867
1983	66,941	8,735	3,166	653	4,424
1984	80,270	10,705	2,320	1,985	2,080
1986	56,855	6,642	1,624	1,015	730
1987	58,237	5,371	1,600	1,016	730
1988	65,225	3,045	2,322	958	1,014
1989	59,769	5,564	2,025	943	630
1990	96,853	9,177	1,930	1,143	1,330
1991	44,278	3,016	2,687	1,011	553
TOTALS	703,120	89,861	35,367	14,382	41,402

GRAND TOTAL OF FISH CAUGHT - 884,132

CAMANCHE

YEAR	TROUT	STURGEON	BLACK BASS	CATFISH	CRAPPIE/ SUNFISH
1991					
NO. SHORE	10,788	6	5,405	760	1,872
SO. SHORE	10,105	8	15,405	1,052	3,343
TOTALS	20,893	14	20,810	1,812	5,215

C-101393

TABLE 2 - NUMBERS OF FISH STOCKED IN PARDEE AND CAMANCHE RESERVOIRS.

PARDEE RESERVOIR
TROUT PLANTED

YEAR	POUNDS	NUMBER	AVERAGE SIZE
1980	36,390	65,433	.56 lbs. ea
1981	34,888	68,753	.51 lbs. ea
1982	36,870	61,913	.60 lbs. ea
1983	66,810	85,560	.78 lbs. ea
1984	82,575	102,835	.80 lbs. ea
1985	76,350	93,410	.82 lbs. ea
1986	70,800	70,800	1.00 lbs. ea
1987	73,425	78,066	.94 lbs. ea
1988	84,060	83,333	.95 lbs. ea
1989	79,000	83,333	.95 lbs. ea
1990	101,800	101,000	1.00 lbs. ea
1991	66,300	66,300	1.00 lbs. ea
TOTALS	641,168	799,516	.82 lbs. ea

Average return of trout planted equals - 70%

CAMANCHE RESERVOIR

YEAR	TROUT	LARGEMOUTH BASS FRY	CHANNEL CATFISH
1990	19,000 lbs.	15,000	4,000 lbs.
1991	61,200 lbs.	24,000	2,000 lbs.
TOTALS	80,200 lbs.	39,000	6,000 lbs.

C-101394

TABLE 3 - NUMBER OF ANGLERS AND VISITORS UTILIZING RECREATIONAL FACILITIES AT PARDEE AND CAMANCHE RESERVOIRS.

PARDEE RESERVOIR
ANGLER DAYS VS. VISITORS

YEAR	ANGLERS	VISITORS	ANGLERS AS A % OF VISITORS
1980	38,843	140,147	28
1981	44,637	146,236	31
1982	48,135	160,800	30
1983	54,201	177,820	30
1984	66,801	198,204	34
1985	58,992	182,588	32
1986	53,831	196,351	27
1987	59,467	133,328	45
1988	64,719	144,179	45
1989	64,849	139,509	47
1990	80,374	139,965	57
1991	52,515	88,490	59
TOTALS	603,884	1,847,617	39

CAMANCHE

YEAR	ANGLERS	VISITORS	ANGLERS AS A % OF VISITORS
1990	30,319	323,529	9
1991	53,797	352,325	15
TOTALS	84,116	675,854	12.5

C-101395

Effects of Pardee Reservoir drawdown on the recreation facilities.
Comparison by different reservoir management alternatives.

No Action Agreement, 1961 (#5502)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Below 535': <144,980	6	6	6	6	2	2	3	4	5	5	6	6
Below 540': <153,845	6	7	8	7	3	3	3	4	5	6	6	6
Below 545': <163,079	7	10	10	8	4	4	4	6	6	6	7	8

LMRMP Management of Camanche Hyplimnion (#5633)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Below 535': <144,980	9	10	11	8	5	6	8	11	16	23	16	13
Below 540': <153,845	13	13	15	10	5	9	9	12	21	31	23	18
Below 545': <163,079	16	22	18	13	8	9	11	19	31	36	26	23

DFG November–1991 Mgmt. Plan, Year 2020 level of devel., (w/o temp. requirements factored in.) (#5588)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Below 535': <144,980	36	37	37	39	33	31	34	38	39	40	42	40
Below 540': <153,845	40	41	40	40	35	32	36	38	40	43	42	41
Below 545': <163,079	43	46	44	41	35	33	38	38	41	43	44	44

DFG November–1991 Mgmt. Plan, Year 1990 level of devel., (w/o temp. constraints) (#5612)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Below 535': <144,980	32	30	32	33	30	28	31	35	36	38	37	35
Below 540': <153,845	33	32	35	36	30	30	31	35	37	38	37	37
Below 545': <163,079	34	35	35	37	31	30	34	36	38	38	39	37

DFG November–1991 Mgmt. Plan, Year 1990 level of devel., (with temp. constraints) (#5619)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Below 535': <144,980	43	42	43	44	40	35	38	42	43	48	37	35
Below 540': <153,845	47	44	46	45	40	37	40	42	43	48	38	37
Below 545': <163,079	48	49	48	48	40	38	40	43	44	50	39	37

Table 4